

**Notice of Allowability**

Application No.

10/020,314

Examiner

Khiem D. Nguyen

Applicant(s)

SHIMAMOTO ET AL.

Art Unit

2823

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the Response and Amendment under 37 C.F.R. 1.111 filed on March 28<sup>th</sup>, 2007.
2. ☒ The allowed claim(s) is/are 1,3-8,10-16 and 18-32.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☒ All    b) ☐ Some\*    c) ☐ None    of the:
    1. ☒ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
  5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
    - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
      - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
    - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08),  
Paper No./Mail Date \_\_\_\_\_
4. ☐ Examiner's Comment Regarding Requirement for Deposit  
of Biological Material

5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413),  
Paper No./Mail Date \_\_\_\_\_
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other \_\_\_\_\_

K.N.  
June 08<sup>th</sup>, 2007

## **DETAILED ACTION**

### ***Allowable Subject Matter***

1. Claims 1, 3-8, 10-16, and 18-32 are allowed over prior art of record.

### ***Reasons For Allowance***

2. The following is an examiner's statement of reasons for allowance:

After further search and consideration of Applicants' response filed on March 28<sup>th</sup>, 2007 (see Applicants' arguments in Pages 11-12 of the March 28<sup>th</sup>, response), it is determined that the prior art of record neither anticipates nor renders obvious the claimed subject matter of the instant application as a whole taken alone or in combination, in particular, prior art of record does not teach "wherein the step (a) includes sub-steps of: (a-2) after the step (a-1), increasing a temperature of the semiconductor substrate in the chamber up to a desired temperature without supplying any oxidation gas to the deposition chamber; (a-3) after the step (a-2), separately supplying the precursor and an oxidation gas into the deposition chamber to form a ruthenium film for the bottom electrode with a desired thickness on the heated semiconductor substrate, the oxidation gas being separately supplied to the deposition chamber by a supplying system different from a precursor supplying system, and only during when the precursor being supplied; (a-4), after the step (a-3), stopping the supply of the precursor and the oxidation gas; and (a-5) after the step (a-4), decreasing the temperature of the semiconductor substrate without supplying the oxidation gas to the deposition chamber, wherein the bottom electrode essentially consists of ruthenium.", as recited in the independent claim 1 and "wherein the step (c) includes sub-steps of: (c-2) after the step (c-1), increasing a

temperature of the semiconductor substrate in the chamber up to a desired temperature with supplying an oxidation gas to the deposition chamber; (c-3) after the step (c-2), separately supplying the precursor and the oxidation gas into the deposition chamber to form a ruthenium film for the top electrode with a desired thickness on the heated semiconductor substrate, the oxidation gas being separately supplied to the deposition chamber by a supplying system different from a precursor supplying system; (c-4) after the step (c-3), stopping the supply of the precursor and the oxidation gas; and (c-5) after the step (c-4), decreasing the temperature of the semiconductor substrate with supplying an oxidation gas to the deposition chamber, wherein the top electrode essentially consists of ruthenium, and the oxidation gas is supplied to the deposition chamber when the substrate temperature is increased, when the precursor is supplied, and when the substrate temperature is decreased.”, as recited in the independent claim 21, respectively.

Claims 3-8, 10-16, 18-20, and 22-32 also allowed as being directly or indirectly dependent of the allowed independent base claims.

3. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

#### ***Conclusion***

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khiem D. Nguyen whose telephone number is (571) 272-1865. The examiner can normally be reached on Monday-Friday (8:30 AM - 5:30 PM).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

K.N.

June 08, 2007



MATTHEW SMITH  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800